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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/589,064	06/08/2000	Nobuhiro Tani	P19212	1395

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EXAMINER	
LONG, HEATHER R	

ART UNIT	PAPER NUMBER
2615	9

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/589,064	TANI, NOBUHIRO	
	Examiner	Art Unit	
	Heather R Long	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-19,21,23 and 24* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *19 and 21* is/are allowed.

6)☒ Claim(s) *1-13,15-18,23 and 24* is/are rejected.

7)☒ Claim(s) *14* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *08 June 2000* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

1. Applicant's arguments have been considered but are moot in view of the new ground(s) of rejection.

Specification

2. Amendment to the title has overcome the earlier objection. Therefore, the objection has been withdrawn.

Claim Rejections - 35 USC § 103

1. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

2. Claims 1-12 and 15-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malek (U.S. Patent 4,915,498) in view of Yahav et al. (U.S. Patent 6,057,909).

Regarding claim **1**, Malek discloses a three-dimensional image capturing device, comprising: a light source that radiates a distance measuring light beam irradiating a measurement subject, the measurement subject reflecting the distance measuring light beam to generate a reflected light beam (transmitter element 14); a plurality of first photoelectric conversion elements (odd lines of the CCD) and a plurality of second photoelectric conversion elements (even lines of the CCD) that receive the reflected light beam, each of the first and second

photoelectric conversion elements (odd and even lines of the CCD) accumulating electric charge corresponding to an amount of the received reflected light beam (element 15 shown in Fig. 1 and in particular element 9); first and second electric charge holding units disposed adjacent to each of the first and second photoelectric conversion elements respectively (having vertical CCDs to transfer charge vertically is implied with a CCD imaging device, wherein the vertical CCDs are charge holding units); and first and second electric charge transfer processors that transfer first and second electric charges accumulation in the first and second photoelectric conversion elements to the first and second electric charge holding units with the first and second electrodes connected only to the first and second electric charge holding units respectively (the signal charge transfer processor is also an implied feature of a CCD in order to transfer charges from pixels to the vertical CCDs). However, Malek fails to disclose an electric charge integrating processor that drives the first electric charge transfer processor repeatedly, so that the first electric charge, relating to the distance information of the measurement subject, is integrated in the first electric charge holding unit.

Referring to the Yahav et al. reference, Yahav et al. discloses that the integration of distance measurement charges can be performed multiple times in a field period in order to increase the signal/noise ratio of the image (col. 3, lines 25-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed Malek's distance measurement operation multiple times in one field in order to increase the signal/noise ratio of the image.

Regarding claim **2**, Malek in view of Yahav et al. discloses a device further comprising: a first and second electric charge discharging processor that discharges unwanted charge accumulated in each of the first and second photoelectric conversion elements, respectively, so that an accumulating operation of electric charge is started in each of the first and second photoelectric conversion elements (Malek: col. 8, lines 6-8). Further note that a clear, integrate, and read operation are implied in Malek's disclosure through the description of the clear operation. Therefore, the electric charge discharging processor and transfer processor would be operated alternately as claimed.

Regarding claim **3**, Malek in view of Yahav et al. discloses a device wherein the first and second photoelectric conversion elements are formed on a substrate, and the first electric charge discharging processor discharges the unwanted charge to the substrate. It is well known in the art to form the photoelectric conversion elements of a CCD on a substrate, wherein unwanted charges are discharged to the substrate. This is typically performed through the use of an overflow drain (OFD). It is further known to use an OFD in order to suppress blooming in an image sensor. Official Notice is taken. Therefore, it would have been obvious to one of ordinary skill in the art at the time the

invention was made to have added an OFD to Malek's CCD in order to suppress blooming.

Regarding claim **4**, Malek in view of Yahav et al. discloses a device wherein the first and second electric charge holding units are provided in a vertical transfer unit that outputs the electric charge from the three-dimensional image capturing device (see Examiner notes on the rejection of claim 1. Note that the vertical CCDs are vertical transfer units).

Regarding claim **5**, Malek in view of Yahav et al. discloses a device wherein the first photoelectric conversion elements (odd lines) are arranged in a predetermined direction (elements span across a row) with a predetermined number of the second photoelectric conversion elements (even lines) between the first photoelectric conversion elements (the odd lines are spaced apart by one even line).

Regarding claim **6**, Malek in view of Yahav et al. discloses a device wherein the first electric charge discharging processor outputs an electric charge discharging signal to discharge the unwanted charge, and the first electric charge holding processor outputs a first electric charge transfer signal to transfer the first electric charge to the first electric charge holding unit, and the second electric charge holding processor outputs a second electric charge transfer signal to transfer the second electric charges to the second electric charge holding unit, the electric charge discharging signal and the first and second charge signals being pulse signals (Malek: From Fig. 3 it can be seen that the signals are pulse

signals. Also see Examiner notes on rejection 2 about the signals be alternately applied).

Regarding claim **7**, Malek in view of Yahav et al. discloses a device wherein the first electric charge, corresponding to at least distance information of the measurement subject, accumulates in the first photoelectric conversion elements until the first photoelectric conversion elements stops receiving the reflected light beam (Examiner notes that accumulation stops when the photoelectric conversion elements stop receiving the reflected light beam, namely when the gated image intensifier stops transmitting the light to the CCD).

Regarding claim **8**, Malek in view of Yahav et al. discloses a device wherein the first electric charge, corresponding to at least distance information of the measurement subject, starts to accumulate in the first photoelectric conversion elements when the electric charge discharging signal ends (col. 8, lines 6-8; Examiner notes that accumulation time would start right after the discharging signal ends in order to not allow any unwanted charge to accumulate in between the time discharging ends and the accumulation time starts).

Regarding claim **9**, Malek in view of Yahav et al. discloses a device wherein the light source radiates a pulsed beam of the distance measuring light beam during a first accumulating period (Malek: col. 7, lines 46-50), which extends from an output of the electric charge discharging signal to an output of the first electric charge transfer signal, and the first electric charge corresponding to distance information regarding the measurement subject is integrated in the

first electric charge holding unit (Malek: Figs. 3c and 3d; Yahav et al.: col. 3, lines 25-39).

Regarding claim **10**, Malek in view of Yahav et al. discloses a device further comprising: a radiating operation control processor that prohibits the light source from radiating the distance measuring light beam; and an image information sensing processor that drives the first and second electric charge discharging processors and the first and second electric charge processors, when the radiating operation control processor prohibits the light source from radiating the distance measuring light, so that the first and second charge corresponding to an image information of the measurement subject is transferred to the first and second electric charge holding units, respectively (Malek: Additive Image – col. 10, line 40 – col. 11, line 3).

Regarding claim **11**, Malek discloses a three-dimensional image capturing device, comprising: a light source that radiates light irradiating a measurement subject (transmitter element 14); a plurality of optical sensors that generate electric charge corresponding to an amount of light received by the optical sensors, the optical sensors being separated into predetermined groups (odd and even lines) (element 15 shown in Fig. 1 and in particular element 9); a plurality of electric charge transfer electrodes applied to each of the optical sensors to output the electric charge generated in the optical sensors, groups of the electric charge transfer electrodes corresponding to the predetermined groups of optical sensors (the signal charge transfer processor is also an implied

feature of a CCD in order to transfer charges from pixels to the vertical CCDs); an electric charge transfer unit that holds the electric charge output from the optical sensors by the electric charge transfer electrodes and transfers the electric charge held in the electric charge transfer unit (having vertical CCDs to transfer charge vertically is implied with a CCD imaging device, wherein the vertical CCDs are charge holding units); and an electric charge transfer electrode control processor that independently controls each of the groups of the electric charge transfer electrodes (the signal charge transfer processor is also an implied feature of a CCD in order to transfer charges from pixels to the vertical CCDs) .

Referring to the Yahav et al. reference, Yahav et al. discloses that the integration of distance measurement charges can be performed multiple times in a field period in order to increase the signal/noise ratio of the image (col. 3, lines 25-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed Malek's distance measurement operation multiple times in one field in order to increase the signal/noise ratio of the image.

Regarding claim **12**, Malek in view of Yahav et al. discloses a three-dimensional image capturing device, comprising: a light source that radiates a distance measuring light beam irradiating a measurement subject, the measurement subject reflecting the distance measuring light beam to generate a

reflected light beam (transmitter element 14); a plurality of photoelectric conversion elements, that receive the reflected light beam, the photoelectric conversion elements accumulating electric charge corresponding to at least distance information based on an amount of the received reflected light beam (element 15 shown in Fig. 1 and in particular element 9); a vertical transfer unit that is disposed along each vertical line of the photoelectric conversion elements, the photoelectric conversion elements transferring the accumulated electric charge in a vertical direction (having vertical CCDs to transfer charge vertically is implied with a CCD imaging device); a horizontal transfer unit that is disposed near one end of the vertical transfer and in parallel with horizontal lines of the photoelectric conversion elements, so that the electric charge is transferred in a horizontal direction (having horizontal CCDs to transfer charge horizontally is implied with a CCD imaging device); an electric charge transfer processor that transfers electric charge accumulated only in photoelectric conversion elements comprising effective horizontal lines (all the lines are effective), which are disposed every predetermined number of the horizontal lines, wherein the predetermined number is 1, (the signal charge transfer processor is also an implied feature of a CCD in order to transfer charges from pixels to the vertical CCDs); and a transfer operation control processor that controls the horizontal transfer unit and the vertical transfer unit, so that the horizontal transfer unit is driven only when the electric charge corresponding to the effective horizontal

lines is transferred to the horizontal transfer unit (Malek: Fig. 1, reference character "4").

Referring to the Yahav et al. reference, Yahav et al. discloses that the integration of distance measurement charges can be performed multiple times in a field period in order to increase the signal/noise ratio of the image (col. 3, lines 25-39).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have performed Malek's distance measurement operation multiple times in one field in order to increase the signal/noise ratio of the image.

Regarding claim **15**, Malek in view of Yahav et al. discloses a device further comprising an electric charge discharging processor that starts accumulating the electric charge in the photoelectric conversion elements by discharging unwanted charge accumulated in the photoelectric conversion elements (Malek: col. 8, lines 6-8). Further note that a clear, integrate, and read operation are implied in Malek's disclosure through the description of the clear operation. Therefore, the electric charge discharging processor and transfer processor would be operated alternately as claimed.

Regarding claim **16**, Malek in view of Yahav et al. discloses a device wherein the photoelectric conversion elements are formed on a substrate and the electric charge discharging processor discharges the unwanted charge to the substrate. It is well known in the art to form the photoelectric conversion

elements of a CCD on a substrate, wherein unwanted charges are discharged to the substrate. This is typically performed through the use of an overflow drain (OFD). It is further known to use an OFD in order to suppress blooming in an image sensor. Official Notice is taken. Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have added an OFD to Malek's CCD in order to suppress blooming.

Regarding claim **17**, it is clear in Malek in view of Yahav et al. that charge accumulation begins after the resetting operation in order to generate a subsequent image.

Regarding claim **18**, Malek in view of Yahav et al. discloses a device wherein the light source radiates a pulsed beam of the distance measuring light beam during a first accumulating period (Malek: col. 7, lines 46-50), which is from an output of the electric charge discharging signal to an output of the electric charge transfer signal, and the electric charge corresponding to distance information regarding the measurement subject is integrated in the vertical transfer unit of the effective horizontal lines (Malek: Figs. 3c and 3d; Yahav et al.: col. 3, lines 25-39).

3. Claims 13, 23, and 24 are rejected under 35 U.S.C. 103(a) as being unpatentable over Malek in view of Yahav et al. as applied to claim 12 above, and further in view of Roberts (U.S. Patent 5,541,654).

Regarding claim **13**, Malek in view of Yahav et al. fails to disclose a device wherein the horizontal lines are separated into a plurality of groups and the effective horizontal lines comprise at least one of the groups.

Referring to the Roberts reference, Roberts discloses a device wherein the horizontal lines are separated into a plurality of groups and the effective lines comprise at least one of the groups (Fig. 6) (col. 10, lines 9-21). It is implicit that any number of groups may be formed in order to scan the pixels at a higher frame rate.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to apply the teachings as disclosed by Roberts to the three-dimensional image capturing device as taught by Malek in view of Yahav et al. in order to further scan the pixels at a higher frame rate by only scanning groups of pixels compared to the whole image.

Regarding claim **23**, Malek in view of Yahav et al. in view of Roberts discloses a device wherein each of the plurality of groups shares at least one of the horizontal lines (see claim 13).

Regarding claim **24**, Malek in view of Yahav et al. in view of Roberts discloses a device wherein the plurality of groups comprises at least three groups (see claim 13).

Allowable Subject Matter

4. Claim 14 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

5. The following is a statement of reasons for the indication of allowable subject matter: prior art fails to teach or fairly suggest a device with all prior claimed elements wherein the horizontal lines are separated into first, second, and third groups, which are arranged in a vertical direction such that the order of first group, second group, second group, third group, second group, second group is repeated.

6. Claims 19 and 21 are allowed.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

7. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

a. Dietrich et al. (U.S. Patent 4,539,598) discloses an image readout device that is constructed to read out a partial image from a total image stored in photo detectors arranged in at least one row or two-dimensionally in rows and columns.

Reading out only a partial image allows for a faster readout time, which is beneficial for tracking a fast object.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Heather R Long whose telephone number is 703-305-0681. The examiner can normally be reached on Mon. - Thurs.: 7:00 am - 4:30 pm, and every other Fri.: 7:00 am - 3:30 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Andrew Christensen can be reached on (703) 308-9644. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HRL
October 4, 2004

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